symbolics

Nov , '82

To: RN, JLK, H, MIN
From: TLM
cc: HIC, DLW, CWR, LSTEAD, RLB
re: Computer Graphics Group

This report proposes the establishment of a computer graphics group within Symbolics. The process will involve a reclassification and restructuring of existing personnel hierarchy as well as augmentation of that group through the hiring of outside personnel. Although the various people within the company who are either involved or interested in graphics are employed in geographically disparate office locations, it is believed that this problem is not as severe as once thought and that a workable solution is attainable.

The immediate task is to unify existing graphics-related projects and personnel within the company. Following this, a set of goals will be defined and a formal plan for achieving these goals will be developed.

The responsibilities of the proposed group, hereafter referred to as "the project," encompass both hardware and software. The software tasks involved are substantial and will represent a significant percentage of the project's charter when measured in terms of manhours. Most important is the development of a device-independent 3-D graphics system and its integration into the LISPM's window system. On the hardware front is the continual evolution of the color frame buffer and its associated peripherals.

Although homogeneous on a global scale, the software tasks can be parsed rather nicely, with the resulting modularization lending itself to independent but parallel development. In other words, with proper specification, evolution of the graphics system components can proceed at both SCH and SCRC.

Personnel initially involved in software activity will be LSTEAD, CWR, with HIC, DLW, and RLB on a part-time basis. At this time, CWR is the only software project member working out of SCH. Although CWR's expertise and experience provide the project with valuable software talent, additional software personnel must be recruited to form the requisite critical mass of talent at SCH. Because of their current responsibilities, DLW, HIC, and RLB are expected to remain only peripherally involved in this project, perhaps offering 20% of their time during 1983. LSTEAD will soon begin to devote full time to this project.

While CWR has quite a bit of graphics experience, and has spent some months using an LM-2, SCH is still lacking a real LISPM wizard. It is hoped that the new network will facilitate a greater degree of communication than has transpired to date. Additionally, the increase in personnel traveling between SCRC and SCH in the next few months will help the cross-fertilization.

The hardware end of the project will be centered at SCH. Currently TLM is the only individual designing graphics hardware. This is expected to change shortly with the hiring of a new engineer and the possible acquisition of an engineer from manufacturing.

Thus the personnel requirements are as follows:

SCRC -	DLW, HIC, RLB	Part-time	
	LSTEAD	Full time	
SCH -	CWR	Full time	
	TLM	Full time	
	Software hire	Full time	Starting late February
	Hardware hire	Full time	Starting ASAP

A high percentage of the work will take place at SCH establishing this office as project headquarters by default. This is a desired outcome as the project and project members will enrich the SCH environment and avoid distracting critical-path personnel at SCRC. The possibility exists that at some future date HIC and/or LSTEAD will relocate to southern California. This move would firmly establish the project in this area.

It is useful to note that the bulk of the software to be written is of the type used by artistically talented individuals in a creative and/or production oriented environment. As such, in order to produce a viable, powerful product with a good user interface, it is both desirable and necessary to obtain the services of individuals experienced in these areas. CWR is one such individual. It is well known that people are most highly motivated and productive when involved in projects they find exciting and rewarding. This is especially true of the very talented individuals the project seeks and is a reason many continue to work at Symbolics. It is desirable then, to create within Symbolics, an environment that nurtures graphics-related research and development. This environment will also be a means of attracting the required talent, who are often not lured by highly competitive monetary compensation.

Part of this proposal is that, starting this spring, Symbolics begin to work with an outside production company on a commercial job. The project will serve as a front-end operation, utilizing ASAS and our color system to develop the motion sequences for a production job.

Presumably we would provide the transformed polygonal data base in a form suitable for our partner's rendering system. Ultimately, the project will develop all of the necessary software for these applications. The benefits of such an undertaking are numerous. Besides the morale benefit, the

development of the capabilities and the evolution of such software is best done by practical application. In parallel with the production job(s), the project will develop an animated company logo for use on training films and commercials, canned show demos, company greeting cards, financial report covers, and advertising literature.

The following is a preliminary list of projects that this group will be responsible for:

Software -
- Continued development of ASAS.
- Writing a Geometric Editing package similar to GEOMED or NYIT's system. (wire frame)
- Development of a rendering system to rasterize the polygonal data base.
- A sophisticated paint system.
- Solids modeling, developed in-house or purchased.
- Text/Graphics integration for electronic mail.
- Organizing the above into a device-independent system.
- Making all of the above work with the window system.
- Tablet interface and point data base editing software. (Data entry and digitization)
- Post-production video mix, chroma key, and character generator. (Video effects)

Hardware -
- Completion of the 3600 color option and its continual evolution.
- Design of a low-cost/low-resolution color option for the 3600.
- Gen-Lock, Frame Grab, and Color Map options for the above systems.
- Study various architectures for a VLSI rendering processor.
- Do the same for frame buffers.
- Development of an object-oriented 3-D color frame buffer.
- Possible support for console video work and video switch development.
- Stay abreast of color display technology.
- Chroma keying and video interface for video effects control.

The products listed above will significantly broaden and diversify the company's product line. The features and performance of the graphics hardware will allow us to compete with Ramtek, Ikonas, Grinnell, De Anza, Megatek, and others. The development of a fully integrated device-independent 3-D software package will have a major impact on the graphics industry. Symbolics will be able to offer a complete 3-D color graphics system to the masses. Applications include image processing and understanding. 3-D color electronic mail, movie/TV animation and special effects, CAD, video games, electronic page composition, scientific simulation and modeling, flight/training simulation, and educational products. Prospective customers would be video game companies, the government, film and TV production companies, schools, research labs, TV studios/networks, and advertising agencies. Symbolics will be in a position to OEM the system to applications houses and in turn, license and distribute the packages developed.

The color graphics-related marketing tasks will be handled by marketing. At present, this responsibility is evenly distributed over the whole department, but this task will soon have to be treated as a separate problem (like the LGP). This change will mandate the hiring of additional marketing and sales people.

Marketing - Constant evaluation of market position and the competition.
Marketing strategy planning.
Special customer requirements.
Guidance in show demo development.
Pricing.

The software project will require the allocation of one 3600 around February. Until then, machine time will have to be scheduled on LM-2s on a non-interference basis with the 3600 Project Task Force. As the project matures, a second 3600 will be required. This should coincide with the hiring of a second or third software person.

The hardware project will require the establishment of some SUDS-like capability. This can be accomplished in several ways. To continue in the current mode of flying personnel around the country is not really acceptable. An alternative is to link SCRC with SCH by a higher baud rate communications link. Either SUDS or LUDS could be run from SCH with some SUPDUP graphics protocal. (I believe CJT and/or BEE intend to work on this.) The third, and ideal solution is to purchase a second VAX for the project and run UNIX/LUDS at SCH. It is expected that an incremental solution (from the first to the third choice) will take place. This is acceptable.

Additionally, the hardware effort will require the immediate allocation of both wizard and 3600 time before any debugging can happen on the color option. If this cannot occur within the next month, TLM will take the opportunity to undertake a revision of the color controller. This will update the board to reflect the thinking of the four months that have transpired since wirewrapping. Wizard and machine time should be allocated to SCH rather than to SCRC.

There will be additional capital equipment requirements--data tablet, terminals (Ambassadors), 3600 consoles (ideally one for each project member), and the usual office supplies for personnel.

This project will require that some planning be done with regards to office space. The planning process now in progress at SCH should address this matter for the interim growth period. It is the ultimate desire of group members to relocate to an office in the Santa Monica area. This appears to be congruent with manufacturing's expansion plans.